

# ABCs of COMPLEX ADHD TREATMENT

Dr. Russet Killough, MD, FRCPC  
Child and Adolescent Psychiatrist,  
Provincial ADHD Clinic, BCCH.  
Clinical Assistant Professor, UBC.



1. "Kids on Monkey Bars" by Fat Camera.; Google Stock Images.



# LAND ACKNOWLEDGEMENT



I respectfully acknowledge that the land I work on is the traditional territory of the Coast Salish peoples, including the Musqueam, Squamish, and the Tsleil-Waututh Nations.

# DISCLOSURES

Nothing to disclose. Dr. Killough does not have any relationships with commercial interests.





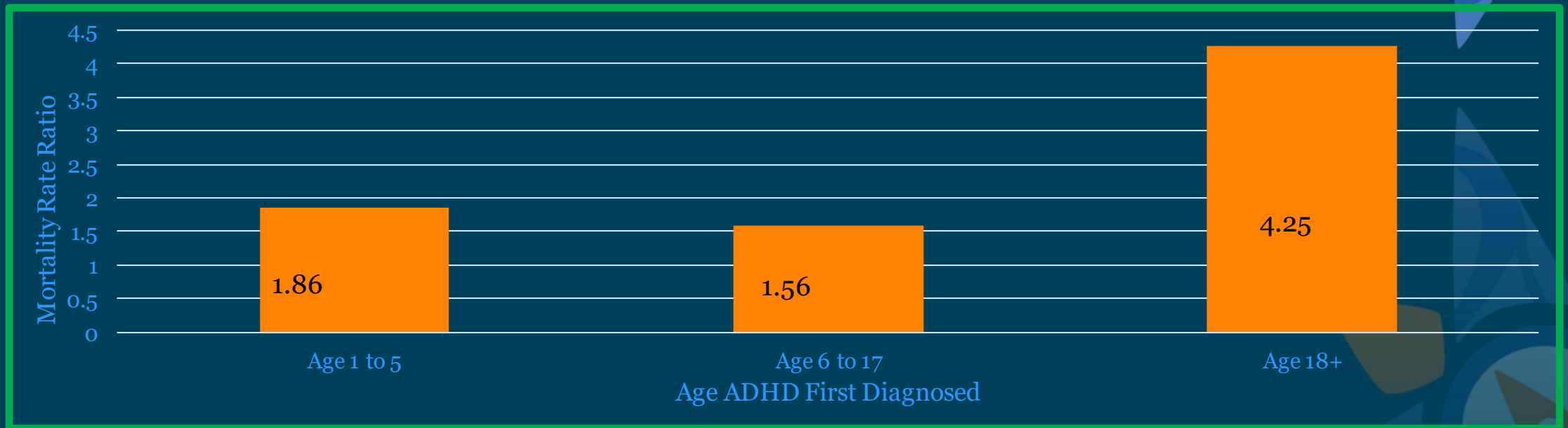
# OBJECTIVES



3. "Bullseye-Clipart" ID 3130235; clipart-library.com; Google Stock Images.

1. To identify ADHD in youth, including comorbidities that increase its complexity.
2. To describe evidence-based guidelines for assessment and intervention for ADHD.
3. To recommend and/or deliver appropriate pharmacological and non pharmacological interventions to manage ADHD or ADHD symptoms without formal diagnosis in youth.

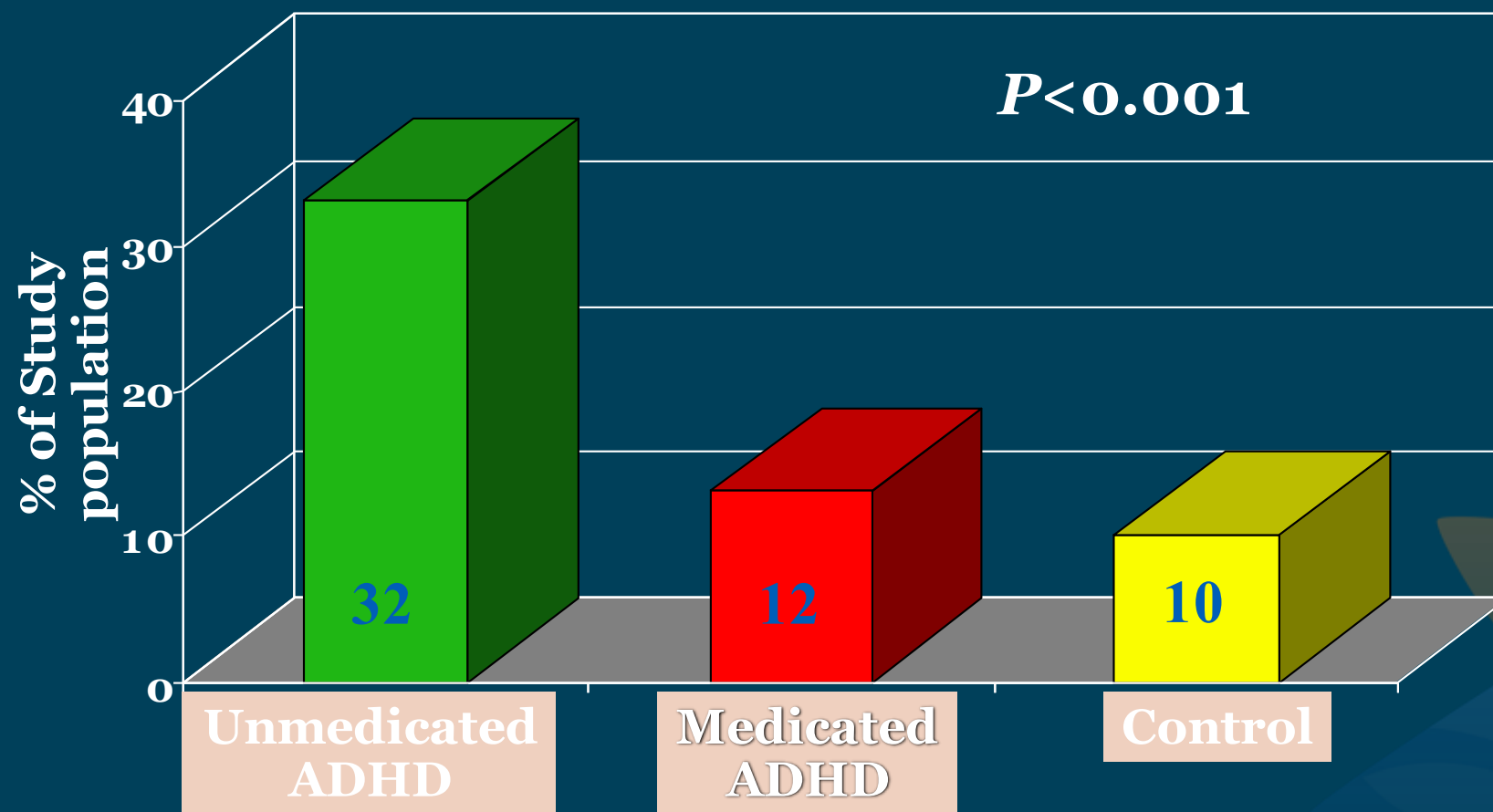
# Excess Adjusted Mortality Rate in ADHD



Dalsgaard et al, Lancet 2015; 385:2190-2196.

# ADHD RX PREVENTS ADULT DRUG ABUSE

Effect of pharmacotherapy



Biederman, Wilens, Mick, et al. *Pediatrics*. 1999; 104:e20-e25.

# WHEN TO TRY MEDICATION

- Evidence of impairment, at home and at school
- Thorough evaluation for co-existing conditions
- No positive cardiac history/family history SCD/arrhythmias
- Baseline assessment of side effects
- Everyone is well educated and prepared for the trial of medication



# CADDRA MEDICATION TABLE

## Quick Guide to ADHD Medication in CANADA - February 2018

Medications available and illustrations of Tabs	Liberation mode (% immediate / delayed)	Particularities	Duration of action <sup>1</sup>	Starting Dose <sup>2</sup>	Dose titration as per product monograph
<b>Amphetamine-based psychostimulants</b>					
<b>Dexedrine®</b> Tablets 5 mg <b>Dexedrine®</b> spansules 10, 15 mg	(100/0)  (50/50)	Pill can be crushed <sup>3</sup> Spansule	~ 4 h  ~ 6 - 8 h	Tablets = 2.5 to 5 mg BID Spansules = q.d. 10 mg am	↑ 2.5 - 5 mg at weekly intervals;  max. dose/day: (q.d. or b.i.d.) All ages = 40 mg
<b>Adderall XR®</b> Capsules 5, 10, 15, 20, 25, 30 mg	(50/50)	Sprinkable Granules	~ 12 h	5 - 10 mg q.d. a.m.	↑ 5 mg at weekly intervals max. dose/day: Children = 30 mg Adolescents and Adults = 20 - 30 mg
<b>Vyvanse®</b> Capsules 10, 20, 30, 40 50, 60, 70* mg	Prodrug	Capsule content can be diluted in water, orange juice and yogurt	~ 13 - 14 h	20 - 30 mg q.d. a.m.	↑ by clinical discretion at weekly intervals max. dose/day: All ages = 60 mg
<b>Methylphenidate-based Psychostimulants</b>					
<b>Methylphenidate short acting</b> Tablets 5 mg (generic) 10, 20 mg (Ritalin®)	(100/0)	Pill can be crushed <sup>3</sup>	~ 3 - 4 h	5 mg b.i.d. to t.i.d. Adult: consider q.i.d.	↑ 5 mg at weekly intervals max. dose/day: All ages = 60 mg
<b>Biphentin®</b> Capsules 10, 15, 20, 30, 40, 50, 60, 80 mg	(40/60)	Sprinkable Granules	~ 10 - 12 h	10 - 20 mg q.d. a.m.	↑ 5 - 10 mg at weekly intervals max. dose/day: Children and Adolescents = 60 mg Adults = 80 mg
<b>Concerta®</b> Extended Release Tabs 18, 27, 36, 54 mg	(22/78)	Pill needs to be swallowed whole to keep delivery mechanism intact	~ 12 h	18 mg q.d. a.m.	↑ 9 - 18 mg at weekly intervals max. dose/day: Children = 54 mg Adolescents = 54 mg / Adults = 72 mg
<b>Foquest®</b> Capsules 25, 35, 45, 55, 70, 85, 100 mg	(20/80)	Sprinkable Granules	~ 16 h	25 mg q.d. a.m.	↑ 10-15 mg in intervals of no less than 5 days Max. dose/day: Adults = 100 mg
<b>Non psychostimulant - Selective Norepinephrine Reuptake Inhibitor</b>					
<b>Strattera®</b> (Atomoxetine) Capsules 10, 18, 25, 40, 60, 80, 100 mg	Not applicable	Capsule needs to be swallowed whole to reduce GI side effects	Up to 24 h	Children and Adolescents : 0.5 mg/kg/day Adults = 40 mg q.d. for 7-14 days	Maintain dose for a minimum of 7 - 14 days before adjusting: Children = 0.8 then 1.2 mg/kg/day 70 kg or Adults = 60 then 80 mg/day max. dose/day : 1.4 mg/kg/day or 100 mg
<b>Non psychostimulant - Selective Alpha-2A Adrenergic Receptor Agonist</b>					
<b>Intuniv XR®</b> (Guanfacine XR) Extended Release Tabs 1, 2, 3, 4 mg	Not applicable	Pills need to be swallowed whole to keep delivery mechanism intact	Up to 24 h	1 mg q.d. (morning or evening)	Maintain dose for a minimum of 7 days before adjusting by no more than 1 mg increment weekly Max. dose/day: Monotherapy: 6-12 years = 4 mg, 13-17 years = 7 mg As adjunctive therapy to psychostimulants 6-17 years = 4 mg

Note: Illustrations do not reflect real size of pills/capsules. For specific details on how to start, adjust and switch ADHD medications, clinicians are invited to refer to the Canadian ADHD Practice Guidelines ([www.caddra.ca](http://www.caddra.ca)). <sup>1</sup> Pharmacokinetics and pharmacodynamic response vary from individual to individual. The clinician must use clinical judgement as to the duration of efficacy and not solely rely on reported values for PK and duration of effect. <sup>2</sup> Starting doses are from product monographs. CADDRA recommends generally starting with the lowest dose available. <sup>3</sup> Higher abuse potential. \* Vyvanse 70 mg is an off-label dosage for ADHD treatment in Canada. Document developed by Annick Vincent MD ([www.attentiondeficit-info.com](http://www.attentiondeficit-info.com)) and Direction des communications et de la philanthropie, Laval University.



# ADHD MEDICATIONS

- ▶ Stimulants and non stimulants (guanfacine XR, atomoxetine) most effective treatments for core ADHD symptoms
- ▶ Stimulants most well-studied medications in psychiatry (350+ studies)
- ▶ High safety ratings – safer than baby aspirin
- ▶ Over 90% of children will improve (50% will be in normal range)
- ▶ Can be used safely for years (compliance a problem in teens; 50% stop using after 3 years)

# CADDRA TREATMENT GUIDELINES 2017

## 1<sup>ST</sup> LINE

- All long acting stimulants (LAS) i.e. Concerta, Biphentin, Foquest, Adderral XR and Vyvanse



9. "Google Android Robot with Pills"  
by Slon.pics; Google Stock Images.

## • 2<sup>ND</sup> LINE

- Short and intermediate acting stimulants
- atomoxetine
- guanfacine XR

## • 3<sup>RD</sup> LINE

- clonidine
- atypical antipsychotics

# STIMULANT POSITIVE EFFECTS

## Improves core symptoms:

- ↑ concentration & attention
- ↓ impulsivity & hyperactivity/restlessness
- ↑ working memory and internalized language

## Secondary effects:

- ↑ work productivity (accuracy)
- ↓ aggression & defiance (studies in children)
- ↑ handwriting & motor coordination
- ↑ self-esteem
- ↑ peer acceptance & interactions
- Better awareness of game in sports
- ↑ driving performance
- ↓ recreational substance abuse



10. "Super Brain Cartoon" by wowomnom;  
istock.com; Google Stock images.

# Stimulants: Common Myths

## Addictive When Used as Prescribed

No, must be inhaled or injected

## Greater Risk of Later Substance Abuse

No, 14 studies find no such result; a few also found decreased risk if continued through teens

## Over-prescribed

No, 4.3 % on medication vs. 5-6% prevalence

## Creates Aggressive, Assaultive Behavior

No, decreases aggression & antisocial actions

## Increased Risk of Seizures

Only at very, very high doses

## Causes Tourette's Syndrome

Can increase pre-existing tics in 30% of cases; decreases in 35%





# STIMULANT SIDE EFFECTS

Dose responsive; most common:

- Insomnia (50% +)
- Loss of Appetite (50%+)
- Headaches (20-40%)
- Stomachaches (20-40%)
- Irritable, Prone to Crying (<10%)
- Nervous Habits & Mannerisms (<10%)
- Tics (<3%) & Tourette's (Rare)
- Mild Weight Loss (mean = 1-4 lbs.; transient)
- Small Effect on Height 1st year (about 1 cm)



11. "Yuck!" ID14343462, © Canettistock; megapixel.com; Google Stock Images.

# MANAGING SIDE EFFECTS

1. Ensure compliance!!
2. Adjust dose
3. Check for rebound
4. Assess for comorbidities and treat these
5. Assess for substances, med diversion/abuse
6. Psychosocial changes
7. Improve sleep hygiene/Melatonin 2 hrs before bedtime
8. Improve eating ie. Higher fat dairy, more protein, Pediasure,



# ADVERSE SIDE EFFECTS OF STIMULANTS

- <5% discontinue due to adverse events ie. Cardiac side effects, suicidal thinking (SI) or agitation.
- Usually SI is decreased with meds.

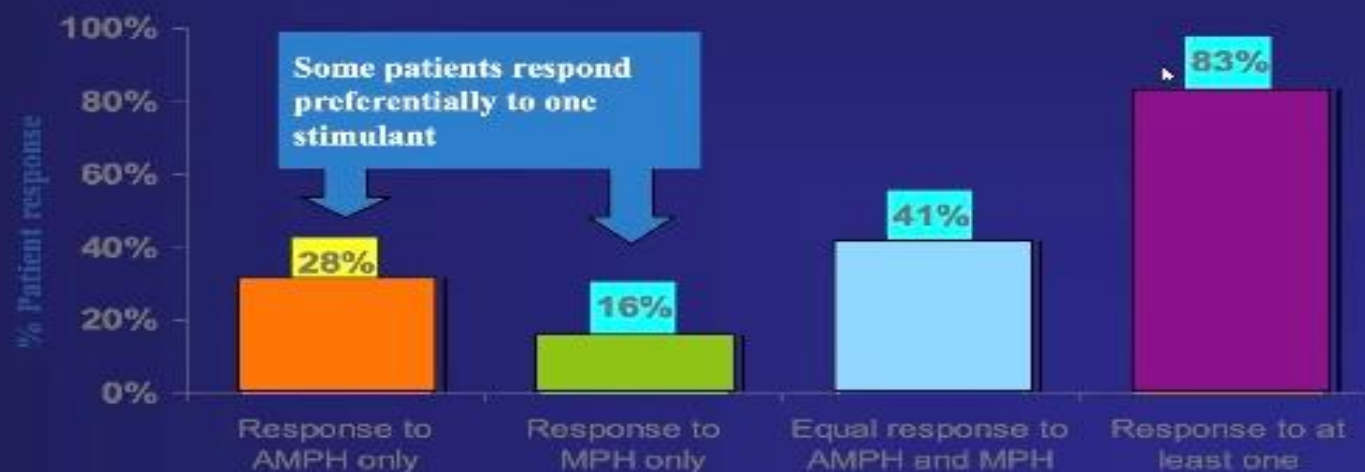


12. "Warning Sign Hazard Symbol by Szabo65; fapng.com; Google Stock Images.



## Patients Who Fail One Stimulant Should be Tried on Another?

Meta-analysis of 6 within-subject comparative trials (n=174) evaluating response to stimulant medications



AMPH, amphetamine; MPH, methylphenidate.

Arnold LE. J Attention Dis 2000;3(4):200-11.



# ATOMOXETINE SIDE EFFECTS

## ➤ Common side effects

- Decreased appetite
- Stomach upset, mild nausea
- Headaches, drowsiness, dizziness
- Potential for irritability
- Energized feelings, nervousness
- Increased heart rate

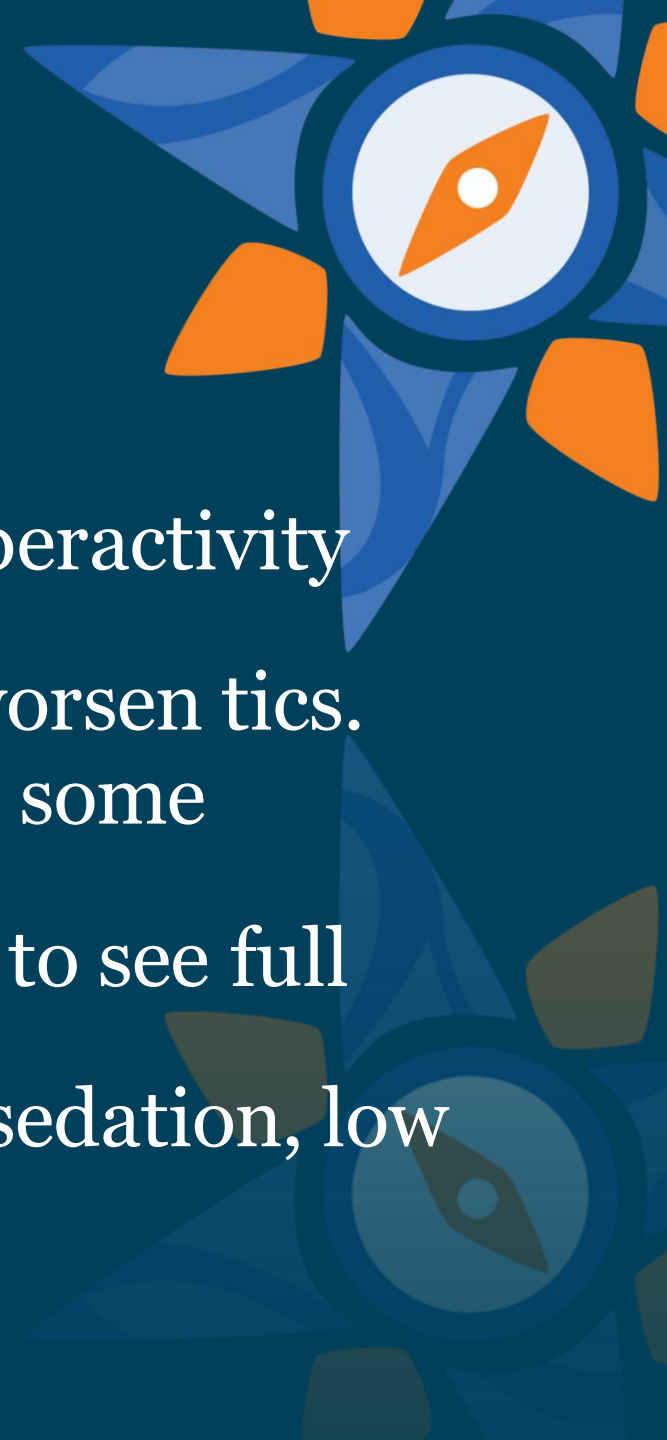
## ➤ Rare side effects

- Liver dysfunction
- Rash
- Agitation and suicidal thinking –caution if dosing with fluoxetine which inhibits it's metabolism!



# GUANFACINE XR

- ALPHA 2 AGONIST.
- Increases norepinephrine in the brain cells.
- Improves focus, **emotional dysregulation**, hyperactivity and impulsivity.
- Does NOT suppress appetite and does NOT worsen tics.
- Does NOT cause insomnia – in fact can cause some daytime sedation.
- Requires daily dosing; Requires 4 to 6 weeks to see full therapeutic effect.
- Uncommon side effects = dizziness, daytime sedation, low blood pressure.



# TREATMENT OF ANXIETY ± DEPRESSION IN ADHD YOUTH

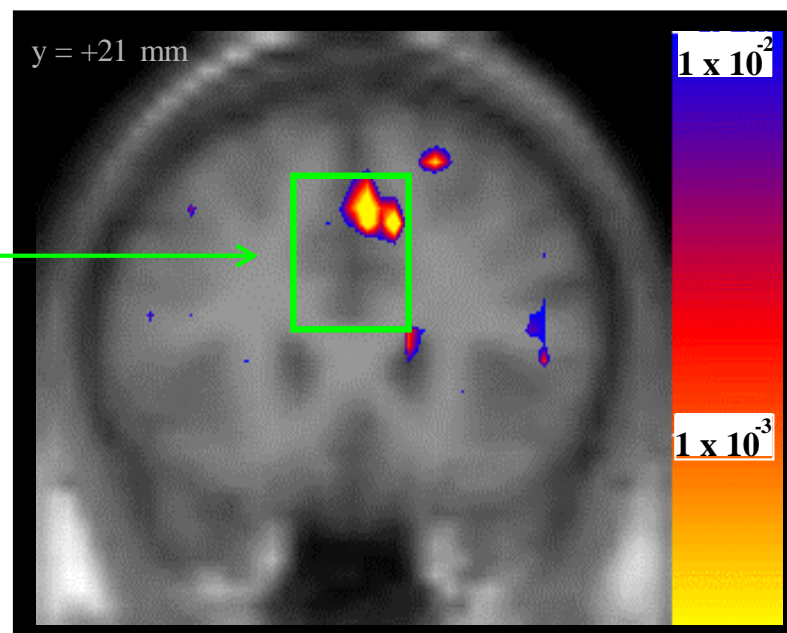
1. For moderate to severe ➡ use SSRI (fluoxetine, sertraline, or citalopram) and start very low and go slow + CBT.
2. For mild to moderate, but ADHD med ≠ therapeutic dose or too many side effects from ADHD med ➡ use SSRI and start very low and go slow + CBT.
3. CBT options: Taming the Worry Dragons group (BCCH, some schools), Cool Kids group (CYMHT), indiv CBT (CYMHT, private).
4. Mindfulness CBT new therapy for teens/adults.
5. CBT FOR Executive Function for teens/adults.

# Neuroimaging and ADHD

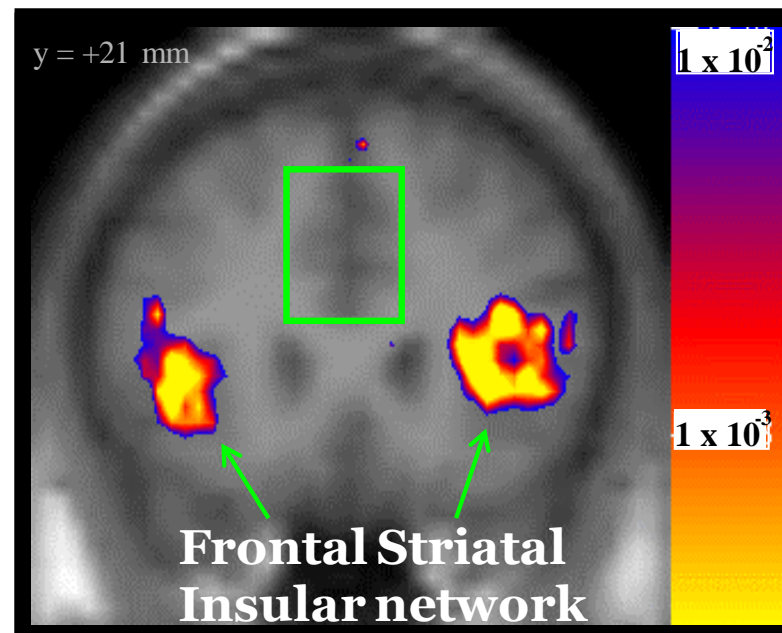
Anterior Cingulate (Cognitive Division) Fails to Activate in ADHD

Anterior  
Cingulate  
Cortex

Normal Controls



ADHD



MGH-NMR Center & Harvard- MIT CITP Bush, et al. *Biol Psychiatry*. 1999;45:1542-1552.

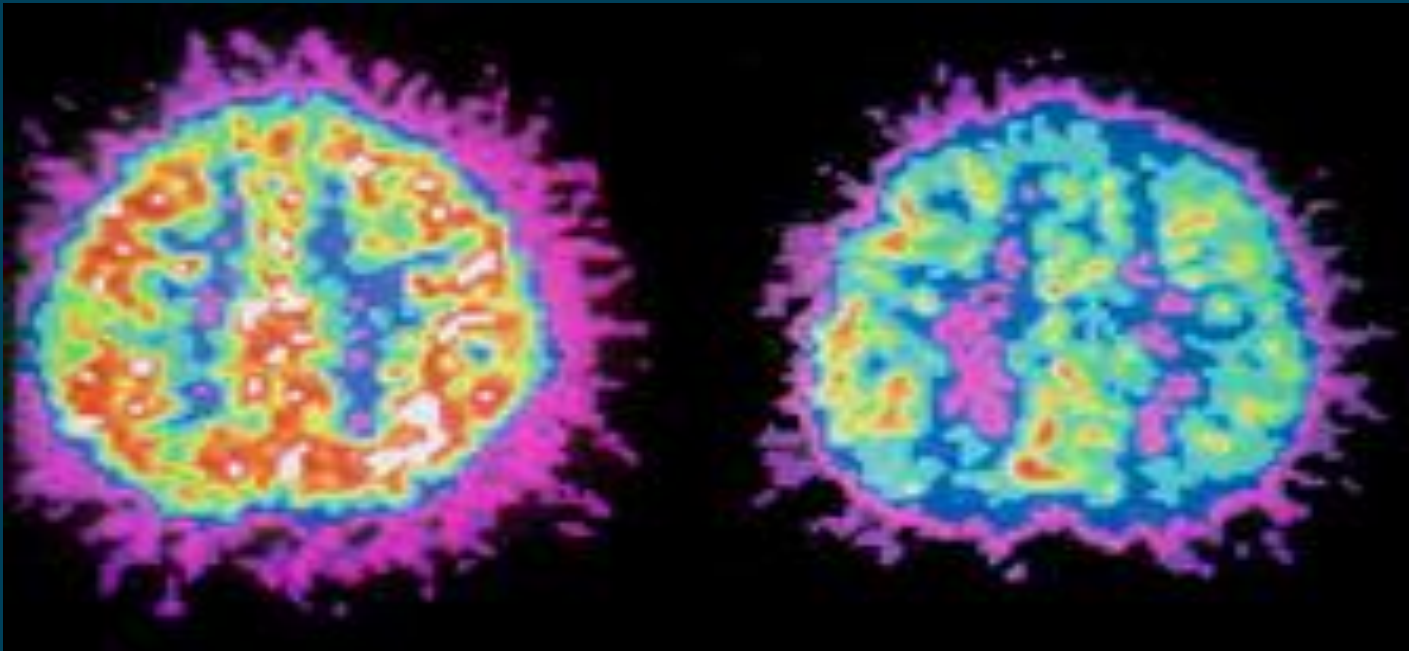


# Neuroimaging and ADHD

## Positron-emission tomography (PET) Scanning

No ADHD

ADHD



*Zametkin, et al. N Engl J Med. 1990;323:1361-1366.*

# THE NEUROPROTECTIVE EFFECT OF STIMULANTS

- Several studies now with long acting stimulants (LAS) which show normalization of frontal lobe function with ADHD youth
- Also see improved brain volumes in LAS Tx ADHD youth
- The LAS Tx ADHD youth brain scans were indistinguishable from the non ADHD kids

# SO WHAT ABOUT BC BUD? IT'S NATURAL...

- No good scientific studies yet to support using it.
- BC Bud is high in THC; decreases working memory and processing speed aka “ADHD-Like” effects.
- Not approved by Health Canada for ADHD Treatment in kids.





19. "Binoid CBD Bottle" by Binoid CBD; Pexels.

## CBD OIL

- Cannibinol (CBD) oil has low THC content, and has been shown in preliminary studies to have an anti- inflammatory effect. But no evidence that inflammation in ADHD.
- Don't have any replicated positive effect with ADHD kids.
- Effective dose also not determined yet.
- CBD oil can negatively interact with medications.



# PRACTICAL CONSIDERATIONS...

1. Cost of medications – extended health plans vs. Special Authority requests for LASs. Go to BC Pharmacare online.
2. Issue of rapid metabolizers..
3. Issue of tolerance and drug holidays..
4. Can they swallow pills? If no, then Biphentin, Foquest (you likely would not use in children though due to its onset of action and length of duration!), Vyvanse or Dex spansule are only options. Sometimes first doing behaviour therapy +/- treating with liquid FLX 5 to 10 mg helps with them overcoming their anxiety about pill swallowing.
5. Worsening ADHD symptoms when SSRI treats their anxiety. This may not be SSRI disinhibition. Look specifically to see if **marked reduced need for sleep and/or grandiosity to distinguish**. If not disinhibition, try LAS low dose and check in 1 week later.
6. Genetic testing costs roughly \$300 to \$400. Unless treatment involves an SSRI, this may not be necessary.



# NON PHARMACOLOGIC TREATMENT OF ADHD

## PROVEN/EVIDENCE BASED

1. Parental education/intervention program
2. Sleep hygiene ± melatonin 2 hr before bed
3. Diet i.e. complex carb + protein, freq snacks, high fat dairy, Pec
4. Omega 3 fatty acids, 750-1000 mg daily
5. 30 min cardio exercise 4-5 X a week
6. Tutoring i.e. Orton Gillingham
7. School based/ "Real life" - Social skills training
8. School accomodations with IEPs.
9. CBT for Executive Function in teens/adults.



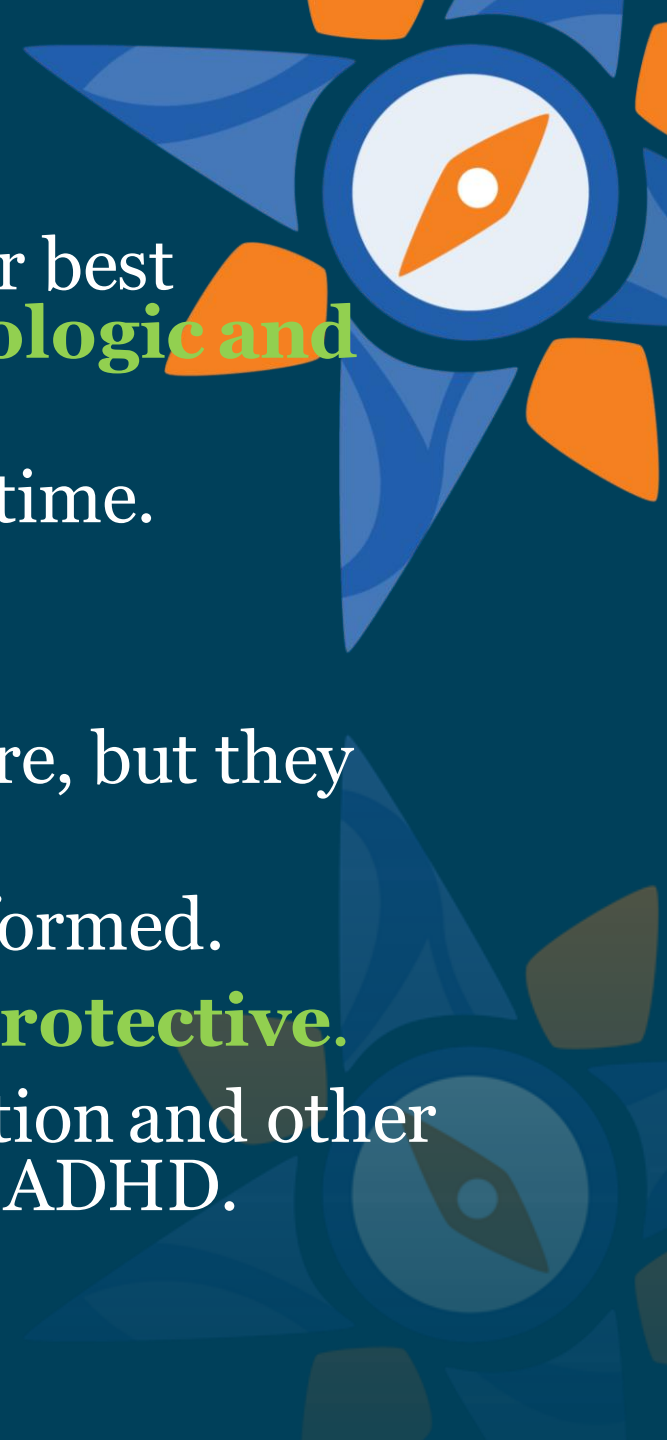
5. "Sleep Emoji" by J.Lover; Clipart ket.com; Google Stock Images.

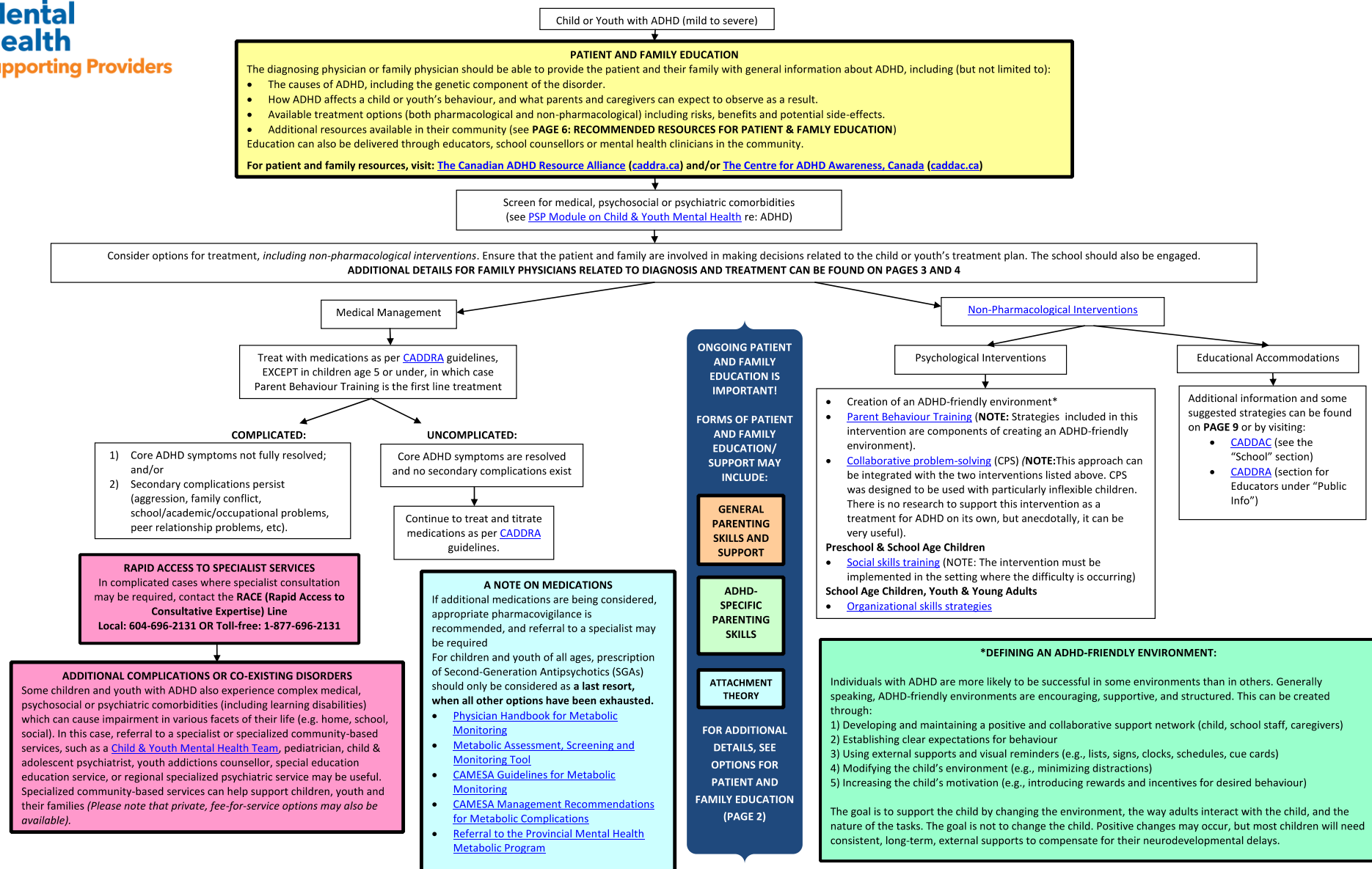


6. ID194454525 © David Tadevosian; Dreamstime.com; Google Stock image.

# CONCLUSIONS

1. Treatment of Complex ADHD is multi faceted. For best outcomes, need to consider **both non pharmacologic and pharmacologic treatment.**
2. The presentation of Complex ADHD changes overtime. Therefore the treatment must adjust accordingly.
3. Start low and go slow with ADHD meds.
4. Screen well for non specific anxiety! It's likely there, but they nor their parents will complain about it!
5. Talk about risks of no treatment so parents are informed.
6. Use of medications has been shown to be **neuroprotective.**
7. Latest research is focused on emotional dysregulation and other executive function skill deficits, as another part of ADHD.





# EDUCATIONAL TOOLS FOR PARENTS

- Provincial ADHD Clinic Parent workshop and parent group
- ADHD Centre private clinic
- CADDAC/CHADD/CADDRA Parent Conferences
- ADHD Parent group thru CYMH teams if Vancouver resident
- Confident Parenting Thriving Kids telephone consultation
- [www.keltymentalhealth.ca](http://www.keltymentalhealth.ca)
- [www.adhdcentre.ca](http://www.adhdcentre.ca)
- [www.caddac.ca](http://www.caddac.ca)
- [www.chaddcanada.com](http://www.chaddcanada.com)
- [www.caddra.ca](http://www.caddra.ca)
- Google “The Developing Brain” in New York Times
- YouTube – Dr. Russell Barkley
- YouTube – How to ADHD





# COMPASS CLINIC TOOLKIT FOR ADHD

